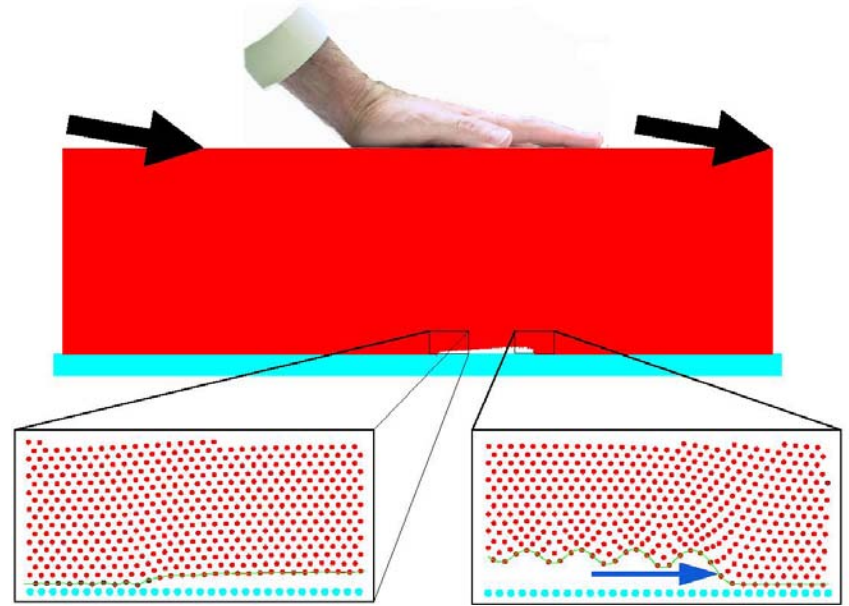


# Friction and Fracture

Michael Marder, The University of Texas at Austin DMR Award# DMR-9877044

Friction is one of the oldest of scientific topics, with quantitative studies reaching back to Leonardo Da Vinci. But precise results are hard to find. Michael Marder and Eric Gerde at The University of Texas at Austin have found a case where the way frictional sliding happens can be predicted exactly, with the motion of every atom described. They studied the sliding of a perfect crystal over a hard surface, and found that it can take place through the high-speed motion of small self-healing cracks. As these cracks open and close they allow the upper solid to slide in just the same way that carpet-layers use puckers in a rug to nudge wall-to-wall carpeting into place. A similar sort of sliding has previously been invoked to explain earthquakes. Now it emerges from exact solutions for sliding of solids at the atomic scale.



*In Marder and Gerde's scenario for friction, one solid slides over another when small puckers, like bumps on a rug, slide at high speed across the surface where the two touch. See **Nature**, v. 413, p. 285 (2001).*

# Educational Activities

Michael Marder, The University of Texas at Austin DMR Award# DMR-9877044

*Faculty:* PI directs UT Austin Discovery

Learning Project, which aims to introduce faculty to methods of inquiry instruction.

*Graduate:* PI recently published a graduate text on *Condensed Matter Physics*, and supervises two graduate research students in materials theory.

*Undergraduate:* PI supervises an undergraduate research student through VIGRE program.

*Secondary Preservice:* PI co-directs and teaches in UTeach, the UT Austin preservice program for secondary mathematics, science, and computer science teachers, now with over 250 undergraduates enrolled (CETP support).

*Primary:* PI directs Young Scientists program, which provides enhanced curriculum and other support for hundreds of sixth-grade minority students, and helps them enter and succeed in Austin's advanced academic programs.



*Master Teacher Mary Long supervises recent UTeach graduate and UTeach student in inquiry lesson.*



*Graduate text on Condensed Matter Physics*